

AMENDMENTS TO THE CLAIMS

The following listing of claims will replace all prior versions and listings of claims in the application.

LISTING OF CLAIMS

1. (Currently Amended) An apparatus comprising:

a single-piece fiducial marker member including:

an imageable fiducial locator head that is locatable by an imaging system, the head being at least semispherical;

a conical receptacle defined by the imageable fiducial locator head that defines an opening that is sized and shaped for engaging a locator instrument of a positioning system, ~~the receptacle integrated with the imageable fiducial locator head and~~ wherein the conical receptacle ~~is configured with~~ has a geometric base at an edge defined by an the opening in an exterior surface of the locator head and a substantially continuously sloping straight wall angled from the geometric base to an apex at a center of the locator head ~~to permit , wherein the locator instrument can~~ access ~~[[to]]~~ a center of the imageable fiducial locator head through the opening; and

a bone screw shaft ~~that extends~~ extending directly outward from the imageable fiducial locator head, at least a portion of the bone screw shaft ~~is configured for being~~ defining a structure to be directly secured to a bone.

2. – 3. (Canceled)

4. (Original) The apparatus of claim 1, further including at least one slot in the imagable fiducial locator head, the at least one slot being sized and shaped for receiving a blade or tip of a screwdriver for turning and threading the bone screw shaft into the bone.

5. (Original) The apparatus of claim 1, in which the imagable fiducial locator head is substantially spherical.

6-7. (Canceled)

8. (Original) The apparatus of claim 1, in which the imagable fiducial locator includes a reflective outer surface that reflects electromagnetic energy.

9. (Original) The apparatus of claim 1, in which the imagable fiducial locator is locatable by at least two different imaging modalities.

10. (Currently Amended) An apparatus comprising:

a fiducial marker including:

an ~~imagable~~ imageable fiducial locator head that is locatable by an imaging system, the head being at least semispherical;

a conical receptacle that is sized and shaped for engaging a locator instrument of a positioning system, the receptacle ~~integrated with~~ defined within the ~~imagable~~ imageable fiducial locator head ~~and configured to permit~~ , wherein access to a center of the ~~imagable~~ imageable fiducial locator head is permitted with the conical receptacle; and

a bone screw shaft that extends directly outward from the ~~imagable~~ imageable fiducial locator head, at least a portion of the bone screw shaft is configured for being secured to a bone;

wherein the ~~imagable~~ imageable fiducial locator head includes a hygroscopic material.

11. (Currently Amended) An apparatus comprising:

- a fiducial marker including:
 - an ~~imagable~~ imageable fiducial locator head that is locatable by an imaging system, the head being at least semispherical;
 - a conical receptacle that is sized and shaped for engaging a locator instrument of a positioning system, the receptacle ~~integrated with~~ defined within the ~~imagable~~ imageable fiducial locator head ~~and configured to permit~~ , wherein access to a center of the ~~imagable~~ imageable fiducial locator head is permitted with the locator instrument;
 - a bone screw shaft that extends outward from the ~~imagable~~ imageable fiducial locator head, at least a portion of the bone screw shaft is configured for being secured to a bone; and
 - a seat in at least one of the ~~imagable~~ imageable fiducial locator head and the shaft, the seat including a kerf operable to accommodate therein loose bone fragments that are channeled upward by the bone screw shaft as it is being secured to the bone.

12. (Original) The apparatus of claim 1, further including an imagable plug, sized and shaped to fit within the receptacle.

13. (Original) The apparatus of claim 1, further including a cover sized and shaped to fit over the imagable fiducial locator head.

14. (Original) The apparatus of claim 1, further including an imagable coating on at least a portion of the imagable fiducial locator head.

15. (Original) The apparatus of claim 1, in which at least a portion of the bone screw shaft is self-tapping.

16. (Original) The apparatus of claim 1, in which at least a portion of the bone screw shaft includes a bone cutting edge.

17. (Canceled)

18. (Original) The apparatus of claim 1, in which at least a portion of the fiducial marker includes an anti-microbial coating.

19. (Original) The apparatus of claim 1, in which the shaft and the head are made from different materials.

20. (Previously Presented) The apparatus of claim 19, in which the head is made from a material that provides a different imaging contrast than the shaft material.

21. (Original) The apparatus of claim 1, in which the shaft includes a distal means for driving into bone without requiring rotation.

22. (Currently Amended) An apparatus comprising:

a fiducial marker including:

an ~~imagable~~ imageable fiducial locator head that is locatable by an imaging system, the head being at least semispherical;

a conical receptacle that is sized and shaped for engaging a locator instrument of a positioning system, the receptacle ~~integrated with~~ defined within the ~~imagable~~ imageable fiducial locator head ~~and configured to permit~~ , wherein access to a center of the ~~imagable~~ imageable fiducial locator head is permitted with the conical receptacle; and

a bone screw shaft that extends directly outward from the ~~imagable~~ imageable fiducial locator head, at least a portion of the bone screw shaft is configured for being secured to a bone;

wherein the shaft includes a laterally expandable distal tip;

wherein a passage is defined by the conical receptacle defined within the imageable fiducial locator head and through the shaft;

wherein a member extends through the passage and the member is operable to be manipulated through the conical receptacle to be rotated to expand the expandable distal tip;

wherein the imageable fiducial locator head defines threads and the member defines complementary threads.

23. (Currently Amended) An apparatus comprising:

a fiducial marker including:

an ~~imagable~~ imageable fiducial locator head that is locatable by an imaging system, the head being at least semispherical;

a conical receptacle that is sized and shaped for engaging a locator instrument of a positioning system, the receptacle ~~integrated with~~ is threaded and defined within the ~~imagable~~ imageable fiducial locator head and wherein the conical receptacle has a base at an edge defined by a surface of the locator head and an apex at a center of the locator head to permit access to a center of the ~~imagable~~ imageable fiducial locator head; and

a bone screw shaft that extends directly outward from the ~~imagable~~ imageable fiducial locator head, at least a portion of the bone screw shaft is configured for being secured to a bone; and

a protective cap sized and shaped for protecting the fiducial marker, wherein the protective cap has a disk-like portion with a threaded portion extending from the disk-like portion that is threadable into the receptacle and a cylindrical circumferential skirt extending from the disk-like portion in the same direction as the threaded portion.

24. (Original) The apparatus of claim 23, in which the protective cap engages the head.

25. (Currently Amended) An apparatus comprising:

a fiducial marker including:

an ~~imagable~~ imageable fiducial locator head that is locatable by an imaging system, the head being at least semispherical;

a conical receptacle that is sized and shaped for engaging a locator instrument of a positioning system, the receptacle ~~integrated with~~ defined within the ~~imagable~~ imageable fiducial locator head and configured to permit access to a center of the ~~imagable~~ imageable fiducial locator head;

a bone screw shaft that extends directly outward from the ~~imagable~~ imageable fiducial locator head, at least a portion of the bone screw shaft is configured for being secured to a bone; and

a protective cap sized and shaped for protecting the fiducial marker;

wherein the protective cap ~~includes a base configured for scalp~~ adhesion has a proximal disk portion, a cylindrical circumferential portion extending from the proximal disk portion, and a distal base flange extending from the cylindrical circumferential portion;

wherein the cylindrical circumferential portion extends a distance from the proximal disk portion such that the proximal disk portion extends over the imageable fiducial locator head and the distal base flange;

an adhesive portion positioned at the distal base flange for adhering the distal base flange to a scalp.

26. (Currently Amended) An apparatus comprising:

a fiducial marker including:

an ~~imagable~~ imageable fiducial locator head that is locatable by an imaging system, the head being at least semispherical;

a conical receptacle that is sized and shaped for engaging a locator instrument of a positioning system, the receptacle ~~integrated with~~ defined within the ~~imagable~~ imageable fiducial locator head and configured to permit access to a center of the ~~imagable~~ imageable fiducial locator head;

a bone screw shaft that extends directly outward from the ~~imagable~~ imageable fiducial locator head, at least a portion of the bone screw shaft is configured for being secured to a bone; and

a protective cap sized and shaped for protecting the fiducial marker;

wherein the protective cap fits about the shaft.

27. (Currently Amended) The apparatus of claim 26, in which the protective cap comprises:

a disk-like base, including a center orifice; and

a circumferential peripheral cylindrical sidewall extending away from the disk-like base and substantially open at a proximal end of the circumferential peripheral cylindrical sidewall away from the disk-like base.

28. (Currently Amended) The apparatus of claim 27, in which the protective cap comprises at least one radial slot in the disk-like base extending from the orifice.

29. (Original) The apparatus of claim 28, in which the protective cap comprises a peripheral sidewall slot aligned to the radial slot.

30. (Original) The apparatus of claim 27, further comprising a disk-like cap sized and shaped to fit over a proximal portion of the sidewall.

31. (Currently Amended) The apparatus of claim 1, further comprising a headband defining holes sized and shaped for protecting ~~at least one~~ the fiducial marker.

32. (Currently Amended) An apparatus comprising:

a fiducial marker including:

a substantially spherical ~~imagable~~ imageable fiducial locator head that is locatable by an imaging system; ~~the imagable fiducial locator head including at least one slot for driving the fiducial marker to secure it to a bone;~~

a conical receptacle that is sized and shaped for engaging a locator instrument of a positioning system, ~~the receptacle integrated with~~ defined within the ~~imagable~~ imageable fiducial locator head and configured to permit access to a center of the ~~imagable~~ imageable fiducial locator head wherein the conical receptacle has a base at an edge of a surface of the fiducial location head and a substantially ~~continuously~~ straight sloping wall to an apex of the conical receptacle; and

a bone screw shaft that extends between a first end and a second end outward from and ~~is formed as an unitary single piece with the imagable fiducial locator head;~~

wherein at least a portion of the bone screw shaft ~~being~~ at the first end is configured for being directly secured to the bone;

wherein the bone screw shaft includes a driving portion accessible through the conical receptacle to drive the fiducial marker into a surface.

33. (Currently Amended) The apparatus of claim 32, in which the receptacle includes an inverted substantially conical divot;

wherein the bone screw shaft includes a drivable portion that extends to the conical divot to be engaged with a driving member.

34. (Currently Amended) The apparatus of claim 32, further comprising:
~~in which the at least one slot includes~~ four slots distributed about a proximal side of the
~~imagable~~ imageable fiducial locator head and extending through respective portions of
the ~~imagable~~ imageable fiducial locator head to intersect the ~~divot~~ conical receptacle.

35. (Previously Presented) The apparatus of claim 32, in which the at least
the portion of the bone screw shaft is externally threaded and is self tapping.

36. (Currently Amended) An apparatus comprising:

a fiducial marker including:

a substantially spherical ~~imagable~~ imageable fiducial locator head that is locatable by an imaging system, the ~~imagable~~ imageable fiducial locator head including at least one slot extending through a side wall of the imageable fiducial locator head to be engaged by a driving instrument for driving the fiducial marker to secure it to a bone;

~~a conical receptacle that is sized and shaped for engaging a locator instrument of a positioning system, the receptacle integrated with~~ defined within the ~~imagable~~ imageable fiducial locator head ~~and configured by a substantially straight wall sloping to an apex at a center of the imageable fiducial locator head~~ to permit access to ~~[[a]]~~ the center of the ~~imagable~~ imageable fiducial locator head and wherein the slot intersects the conical receptacle; and

a bone screw shaft that extends directly outward from the ~~imagable~~ imageable fiducial locator head, the shaft integrated with the ~~imagable~~ imageable fiducial locator head, at least a portion of the bone screw shaft being configured for being directly secured to the bone;

in which at least a portion of the bone screw shaft is externally threaded and includes a quarter cylindrical cutout extending from a distal tip of the shaft.

37. (Previously Presented) The apparatus of claim 32, in which the shaft includes an unthreaded portion separating an externally threaded portion of the shaft from the ~~imagable~~ fiducial locator head.

38. (Original) The apparatus of claim 37, further including a seat where the unthreaded portion of the shaft meets the externally threaded portion of the shaft.

39. (Original) The apparatus of claim 38, in which the seat includes a groove.

40. (Original) The apparatus of claim 32, further including an imagable plug, sized and shaped to fit within the receptacle.

41. (Original) The apparatus of claim 32, further including a cover sized and shaped to fit over the imagable fiducial locator head.

42. (Original) The apparatus of claim 32, further including an imagable coating on at least a portion of the imagable fiducial locator head.

43. (Original) The apparatus of claim 32, in which at least a portion of the bone screw shaft includes a bone cutting edge.

44. (Canceled)

45. (Original) The apparatus of claim 32, in which at least a portion of the fiducial marker includes an anti-microbial coating.

46. (Original) The apparatus of claim 32, in which the shaft and the head are made from different materials.

47. (Original) The apparatus of claim 46, in which the head is made from a material that provides a different imaging contrast than the shaft material.

48. (Original) The apparatus of claim 32, in which the shaft includes a distal means for driving into bone without requiring rotation.

49. (Currently Amended) An apparatus comprising:

a fiducial marker including:

a substantially spherical ~~imagable~~ imageable fiducial locator head that is locatable by an imaging system, the ~~imagable~~ imageable fiducial locator head including at least one slot extending through a side wall of the imageable fiducial locator head to be engaged by a driving instrument for driving the fiducial marker to secure it to a bone;

a conical receptacle that is sized and shaped for engaging a locator instrument of a positioning system, the receptacle ~~integrated with~~ defined within the ~~imagable~~ imageable fiducial locator head and ~~configured~~ to permit access to a center of the ~~imagable~~ imageable fiducial locator head; and

a bone screw shaft that extends directly outward from the ~~imagable~~ imageable fiducial locator, the shaft integrated with the ~~imagable~~ imageable fiducial locator head, at least a portion of the bone screw shaft being configured for being directly secured to the bone~~[:]~~, wherein the shaft includes a laterally expandable distal tip;

a member extending through at least a portion of the shaft to engage the expandable distal tip and a passage through at least a portion of the imageable fiducial locator head to allow access to the member to manipulate the member to expand the expandable distal tip;

wherein the passage defines internal threads and the member defines external threads, where the internal and external threads cooperate to move the member axially when the member is rotated.

50. (Original) The apparatus of claim 32, further including a protective cap sized and shaped for protecting the fiducial marker.

51. (Original) The apparatus of claim 50, in which the protective cap engages the head.

52. (Currently Amended) An apparatus comprising:

a fiducial marker including:

a substantially spherical imagable fiducial locator head that is locatable by an imaging system, the imagable fiducial locator head including at least one slot extending through a side wall of the imageable fiducial locator head to be engaged by a driving instrument for driving the fiducial marker to secure it to a bone;

a conical receptacle that is sized and shaped for engaging a locator instrument of a positioning system, the receptacle integrated with the imagable fiducial locator head and configured to permit access to a center of the imagable fiducial locator head;

a bone screw shaft that extends outward from the imagable fiducial locator, the shaft integrated with the imagable fiducial locator head, at least a portion of the bone screw shaft being configured for being directly secured to the bone; and

a protective cap sized and shaped for protecting the fiducial marker;

wherein the protective cap ~~includes a base configured for scalp~~ adhesion has a proximal disk portion, a cylindrical circumferential portion extending from the proximal disk portion, and a distal base flange extending from the cylindrical circumferential portion;

wherein the cylindrical circumferential portion extends a distance from the proximal disk portion great enough such that the proximal disk portion extends over the imageable fiducial locator head and the distal base ring flange portion;

an adhesive portion positioned at the distal base flange for adhering the distal base flange to a scalp.

53. (Currently Amended) An apparatus comprising:

a fiducial marker including:

a substantially spherical ~~imagable~~ imageable fiducial locator head that is locatable by an imaging system, the ~~imagable~~ imageable fiducial locator head including at least one slot extending through a side wall of the imageable fiducial locator head to be engaged by a driving instrument for driving the fiducial marker to secure it to a bone;

a conical receptacle that is sized and shaped for engaging a locator instrument of a positioning system, the receptacle ~~integrated with~~ defined within the ~~imagable~~ imageable fiducial locator head and ~~configured~~ to permit access to a center of the ~~imagable~~ imageable fiducial locator head;

a bone screw shaft that extends directly outward from the ~~imagable~~ imageable fiducial locator head, the shaft integrated with the ~~imagable~~ imageable fiducial locator head, at least a portion of the bone screw shaft being configured for being directly secured to the bone; and

a protective cap sized and shaped for protecting the fiducial marker;

in which the protective cap fits about the shaft.

54. (Currently Amended) The apparatus of claim 53, in which the protective cap comprises:

a disk-like base, ~~including~~ defining a first diameter and a center orifice having a second diameter less than the first diameter; and

a circumferential peripheral cylindrical sidewall defining a third diameter greater than the second diameter;

wherein the circumferential peripheral cylindrical sidewall extends away from the disk-like base.

55. (Original) The apparatus of claim 54, in which the protective cap comprises at least one radial slot in the base from the orifice.

56. (Original) The apparatus of claim 55, in which the protective cap comprises a peripheral sidewall slot aligned to the radial slot.

57. (Original) The apparatus of claim 54, further comprising a disk-like cap sized and shaped to fit over a proximal portion of the sidewall.

58. (Currently Amended) The apparatus of claim 32, further comprising a headband defining an opening sized and shaped for protecting at least one fiducial marker.

59. (Currently Amended) A method comprising:

driving directly into a bone of a patient a fiducial marker device including both at least a semispherical ~~imagable~~ imageable fiducial locator head and an integral conical receptacle defined by the imageable fiducial locator head sized and shaped to permit access to a center of the imageable fiducial locator head by ~~[[for]]~~ mating ~~[[to]]~~ with an instrument detectable by a positioning system ~~and configured to permit access to a center of the imagable fiducial locator head;~~

obtaining, using an imaging system, an image of the patient, including the ~~imagable~~ imageable fiducial locator head; and

providing an apex of the conical receptacle at the center of the imageable fiducial locator head;

providing a substantially ~~continuous~~ straight wall from an edge defined by a surface of the imageable fiducial locator head to the apex of the conical receptacle;

accessing the apex with the instrument by moving the instrument towards the apex while the instrument is substantially angled relative to an axis along the height of the integral conical receptacle; and

mating the instrument to the receptacle to register an actual position of the patient to the image of the patient.

60. (Original) The method of claim 59, further comprising introducing a fluid or gel into association with a portion of the imagable locator head before the obtaining the image of the patient.

61. (Original) The method of claim 60, further comprising positioning a cover about the imagable locator head.

62. (Original) The method of claim 59, further including drilling a hole into the bone before the driving, and wherein the driving includes screwing into the hole.

63. (Currently Amended) The method of claim 59, further including placing a cap in a ~~divot~~ the conical receptacle of ~~[[a]]~~ the fiducial marker.

64. (Previously Presented) A method comprising:

driving directly into a bone of a patient a fiducial marker device including both an at least semispherical ~~imagable~~ imageable fiducial locator head and an integral conical receptacle defined within the imageable fiducial locator head sized and shaped for mating to an instrument detectable by a positioning system and configured to permit access to a center of the ~~imagable~~ imageable fiducial locator head;

obtaining, using an imaging system, an image of the patient, the image including the ~~imagable~~ imageable locator head;

providing a substantially straight wall from an edge defined by a surface of the imageable fiducial locator head to an apex of the conical receptacle;

mating the instrument to the receptacle to register an actual position of the patient to the image of the patient;

engaging a member positioned within a distal portion of the fiducial marker through the conical receptacle; and

rotating the member to axially move the member and laterally expanding a
expand the distal portion of the fiducial marker device to assist in affixing the fiducial marker device to the bone.

65. (Currently Amended) A method comprising:

driving directly into a bone of a patient a fiducial marker device including both an at least semispherical ~~imagable~~ imageable fiducial locator head and an integral conical receptacle in the imageable fiducial locator head sized and shaped for mating to an instrument detectable by a positioning system and configured to permit access to a center of the ~~imagable~~ imageable fiducial locator head;

obtaining, using an imaging system, an image of the patient, the image including the ~~imagable~~ imageable locator head;

mating the instrument to the receptacle to register an actual position of the patient to the image of the patient; and

disposing a protective collar into association with the fiducial marker device by passing a shaft extending from the imageable fiducial locator head through a peripheral slot and a radial slot in a base of the protective collar.

66. (Currently Amended) The method of claim 65, further including capping the collar after disposing the protective collar into association with the fiducial marker device to at least partially house the fiducial marker device.

67. (Original) The method of claim 59, further including disposing a guide collar about the fiducial marker device before the driving.

68. (Currently Amended) A method comprising:

driving directly into a bone of a patient a fiducial marker device including both an at least semispherical imagable locator head and an integral conical receptacle sized and shaped for mating to an instrument detectable by a positioning system and configured to permit access to a center of the imagable fiducial locator head;

obtaining, using an imaging system, an image of the patient, the image including the imagable locator head;

mating the instrument to the receptacle to register an actual position of the patient to the image of the patient;

disposing a guide collar assembly about the fiducial marker device before the driving, wherein disposing the guide collar assembly includes providing a first member and disposing a second member at least partially around the first member;

removing the second member of the guide collar assembly after the driving; and

leaving only the first member of the guide collar assembly about the fiducial marker during a time period in which the patient is to be protected against a mechanical impact to the fiducial marker.

69. (Original) The method of claim 68, further comprising removing at least a portion of the guide collar axially from the fiducial marker.

70. (Original) The method of claim 68, further comprising removing at least a portion of the guide collar laterally from the fiducial marker.

71-75. (Canceled)

76. (Currently Amended) An apparatus comprising:

- a fiducial marker including:
 - an ~~imagable~~ imageable fiducial locator head that is locatable by an imaging system;
 - a male or female receptacle that is sized and shaped for engaging a locator instrument of a positioning system, the receptacle integrated with the ~~imagable~~ imageable fiducial locator head; and
 - a bone screw shaft extends directly outward from the ~~imagable~~ imageable fiducial locator head, at least a portion of the bone screw shaft is configured for being secured to a bone; and
 - a protective cap sized and shaped for protecting the fiducial marker, ~~the protective cap configured to fit about the bone screw shaft;~~
- wherein the protective cap includes an inner member defining an external thread and outer member defining an internal thread, wherein the outer member can be rotated relative to the inner member to adjust a height of the outer member relative to the inner member.

77. (Previously Presented) The apparatus of claim 76, in which the protective cap comprises:

- a disk-like ~~base, including a center orifice;~~ and
- ~~— a circumferential peripheral cylindrical sidewall~~ portion including a threaded member extending from the disk-like portion to engage a thread in the conical receptacle to connect the inner member and the imageable fiducial locator head.

78. – 80. (Canceled)

81. (Currently Amended) An apparatus comprising:
a fiducial marker including:
an ~~imagable~~ imageable fiducial locator head that is locatable by an imaging system;
a male or female receptacle that is sized and shaped for engaging a locator instrument of a positioning system, the receptacle ~~integrated with~~ defined by the ~~imagable~~ imageable fiducial locator head;
an imageable plug, sized and shaped to fit within the receptacle and locatable with the imaging system; and
a bone screw shaft extends directly outward from the ~~imagable~~ imageable fiducial locator head, at least a portion of the bone screw shaft is configured for being secured to a bone, the shaft including a laterally expandable distal tip.

82. (Previously Presented) The apparatus of claim 81, in which the receptacle includes a substantially conical divot including an apex that is integrally located, with respect to the ~~imagable~~ fiducial locator head, such that a center of an image of the ~~imagable~~ fiducial locator substantially coincides with the apex of the divot.

83. (Previously Presented) The apparatus of claim 81, further including at least one slot in the ~~imagable~~ fiducial locator head, the at least one slot being sized and shaped for receiving a blade or tip of a screwdriver for turning and threading the bone screw shaft into the bone.

84. (Previously Presented) The apparatus of claim 81, in which the imagable fiducial locator includes a reflective outer surface that reflects electromagnetic energy.

85. (Previously Presented) The apparatus of claim 81, in which the imagable fiducial locator is locatable by at least two different imaging modalities.

86. (Previously Presented) The apparatus of claim 81, in which the imagable fiducial locator includes a hygroscopic material.

87. (Canceled)

88. (Currently Amended) An apparatus comprising:

a fiducial marker including:

a substantially spherical ~~imagable~~ imageable fiducial locator head that is locatable by an imaging system, the ~~imagable~~ imageable fiducial locator head including at least one slot for driving the fiducial marker to secure it to a bone;

a receptacle that is sized and shaped for engaging a locator instrument of a positioning system, the receptacle ~~integrated with~~ defined within the ~~imagable~~ imageable fiducial locator head to permit access to a center of the ~~imagable~~ imageable fiducial locator head;

an imageable plug, sized and shaped to fit within the receptacle defined within the imageable fiducial locator head, wherein the imageable plug includes a fin operable to cooperate with the slot such that the imageable fiducial locator head and the imageable plug together present a uniformly shaped imageable portion to the imaging system; and

a bone screw shaft that connects to and extends directly outward from the ~~imagable~~ imageable fiducial locator head, ~~the shaft integrated with the imagable fiducial locator head~~, at least a portion of the bone screw shaft being configured for being directly secured to the bone, at least a portion of the bone screw shaft that being externally threaded and including a quarter cylindrical cutout extending from a distal tip of the shaft.

89. (Canceled)

90. (Previously Presented) The apparatus of claim 88, further including a cover sized and shaped to fit over the imagable fiducial locator head.

91. (Currently Amended) An apparatus comprising:

a unitary fiducial marker including:

a substantially spherical ~~imagable~~ imageable fiducial locator head that is locatable by an imaging system, the ~~imagable~~ imageable fiducial locator head including at least one slot for driving the fiducial marker to secure it to a bone;

a receptacle that is sized and shaped for engaging a locator instrument of a positioning system, the receptacle integrated with the ~~imagable~~ imageable fiducial locator head to permit access to a center of the ~~imagable~~ imageable fiducial locator head;

a bone screw shaft that extends outward from the ~~imagable~~ imageable fiducial locator, the bone screw shaft integrated with the ~~imagable~~ imageable fiducial locator head, at least a portion of the bone screw shaft being configured for being directly secured to the bone, the bone screw shaft including an externally unthreaded portion separating an externally threaded portion of the bone screw shaft from the ~~imagable~~ fiducial locator head; and

an ~~imagable~~ imageable plug, sized and shaped to fit within the receptacle.

92. (Previously Presented) The apparatus of claim 91, further including a seat where the unthreaded portion of the shaft meets the externally threaded portion of the shaft; wherein the seat is defined as the unthreaded portion defining an external diameter greater than a major diameter of the threaded portion to define a depth stop of the fiducial marker.

93. (Currently Amended) The apparatus of claim 92, in which the seat includes a groove operable to collect a material as the screw shaft is connected to a bone.

94. (Currently Amended) A method comprising:

driving directly into a bone of a patient a fiducial marker device including both an ~~imagable~~ imageable locator head and an integral male or female receptacle sized and shaped for mating to an instrument detectable by a positioning system;

rotating a member to axially move the member to laterally expanding
expand a distal portion of the device to assist in affixing the fiducial marker device to the bone;

obtaining, using an imaging system, an image of the patient, the image including the imagable locator head; and

mating the instrument to the receptacle to register an actual position of the patient to the image of the patient.

95. (Previously Presented) The method of claim 94, further comprising positioning a cover about the imagable locator head.

96. (Previously Presented) The method of claim 94, further including drilling a hole into the bone before the driving, and wherein the driving includes screwing into the hole.

97. (Previously Presented) The method of claim 94, further including placing a cap in a divot of a fiducial marker.

98. (Currently Amended) A method comprising:

disposing a guide collar assembly, having a first member and a second member disposed around the first member, about ~~[[the]]~~ a fiducial marker device ~~and leaving the guide collar about the fiducial marker during a time period in which the patient is to be protected against a mechanical impact to the fiducial marker;~~

driving directly into a bone of a patient ~~[[a]]~~ the fiducial marker device including both an ~~imagable~~ imageable locator head and an integral male or female receptacle sized and shaped for mating to an instrument detectable by a positioning system through the guide collar assembly;

removing only the second member ~~at least a portion~~ of the guide collar assembly axially from the fiducial marker;

leaving the first member of the guide collar assembly about the fiducial marker during a time period after removing the second member in which the patient is to be protected against a mechanical impact to the fiducial marker;

obtaining, using an imaging system, an image of the patient, the image including the imagable locator head; and

mating the instrument to the receptacle to register an actual position of the patient to the image of the patient.

99. (Previously Presented) The method of claim 98, further including drilling a hole into the bone before the driving, and wherein the driving includes screwing into the hole.

100. (Previously Presented) The method of claim 98, further including placing a cap in a divot of a fiducial marker.

101. (Currently Amended) A method comprising:

disposing a guide collar assembly about ~~[[the]]~~ a fiducial marker device,
wherein the guide collar assembly includes a first inner member and a second outer
member positioned around the first inner member and leaving the guide collar about the
fiducial marker during a time period in which the patient is to be protected against a
mechanical impact to the fiducial marker;

driving directly into a bone of a patient ~~[[a]]~~ the fiducial marker device
including both an ~~imagable~~ imageable locator head and an integral male or female
receptacle sized and shaped for mating to an instrument detectable by a positioning
system through the guide collar assembly;

leaving the first inner member of the guide collar assembly about the
fiducial marker during a time period in which the patient is to be protected against a
mechanical impact to the fiducial marker after the driving;

removing ~~at least a portion~~ the first inner member of the guide collar
assembly laterally from the fiducial marker;

obtaining, using an imaging system, an image of the patient, the image
including the ~~imagable~~ imageable locator head; and

mating the instrument to the receptacle to register an actual position of the
patient to the image of the patient.

102. (Previously Presented) The method of claim 101, further including
drilling a hole into the bone before the driving, and wherein the driving includes
screwing into the hole.

103. (Previously Presented) The method of claim 101, further including placing a cap in a divot of a fiducial marker.

104. (Previously Presented) The apparatus of claim 91, wherein the receptacle includes a substantially continuously sloping wall to an apex at a center of the fiducial locator head from a base at an edge defined by a surface of the fiducial locator head.

105. (New) The apparatus of Claim 1, wherein the geometric base is defined at an opening in the exterior surface so that the locator instrument is operable to contact the center of the locator head at the apex of the conical receptacle.

106. (New) The apparatus of claim 77, wherein the external thread of the inner member is defined in a sidewall extending from and around a periphery of the disk-like portion.

107. (New) The apparatus of claim 81, wherein the imageable fiducial locator head includes a slot and the imageable plug includes a fin;

wherein the slot and the fin are operable to cooperate such that the imageable fiducial locator head and the imageable plug together present a uniformly shaped imageable portion to the imaging system.

108. (New) The apparatus of claim 90, wherein the cover includes a connection member operable to engage the receptacle when the imageable plug is removed.